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Correlation of Core Muscle Endurance with Urge Incontinence, Severity and Quality of Life in Middle Aged Diabetic Women

Vidhi Gopani[1], Dr. Gira Thakrar[2]

[1] 1st year MPT student, [2]PhD, Senior Lecturer,
JG College of Physiotherapy, Gujarat University, Ahmedabad, India.

Corresponding Author: Vidhi Gopani

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ABSTRACT

BACKGROUND AND NEED OF RESEARCH: Recent epidemiological evidence suggests that incontinence is associated with type 2 diabetes and is more common among women with type 2 diabetes. Core muscle endurance is crucial for maintaining detrusor muscle function. However, diabetes can cause microvascular damage to the muscles, which may impair core muscle endurance and, in turn, contribution to urinary incontinence.
AIMS AND OBJECTIVE: This study aims to investigate correlation of core muscle endurance with urge incontinence, severity and quality of life in middle aged diabetic women.
METHOD: A correlation study was conducted with 39 middle aged diabetic women aged 40 to 60 were included. Participants completed Patient Perception of Intensity of Urgency Scale, International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form, Incontinence Impact Questionnaire 7 for urge incontinence, severity, quality of life respectively and core muscle endurance was assessed using Prone Plank Test.
RESULTS: Data of study shows non-normal distribution hence Spearman rho test was used. The result shows strong correlation between core muscle endurance with urge incontinence ($r = -0.79$, $p < 0.05$), severity ($r = -0.82$, $p < 0.05$), quality of life ($r = -0.85$, $p < 0.05$).
CONCLUSION: As Core muscle endurance decreases, it increases the risk of urge incontinence, severity and decrease the quality of life in diabetic population.

Keywords: Correlation, core muscle endurance, urge incontinence, severity, quality of life, middle aged diabetic women.

INTRODUCTION

Urge UI represents leakage accompanied by or immediately preceded by a strong urge to urinate.[1] Urinary incontinence is a highly prevalent condition affecting nearly 50% of middle-aged women.[2][3] Most of the studies of risk factors related to incontinence have included cross sectional studies, with the best studied factors being parity, age, and obesity. Vaginal delivery seems to be the most important risk factor for life time incontinence in specific women.[4] Recent epidemiological evidence suggests that incontinence is associated with type 2 diabetes and is 50-200% more common among women with type 2 diabetes than among women with normal glucose levels.[5][6] A likely etiology for

incontinence in diabetes is microvascular damage, similar to the disease process involved in development of retinopathy, nephropathy, and neuropathy.[7] Accordingly, duration of diabetes [8], insulin treatment [5], peripheral neuropathy, and retinopathy [8] have been suggested as risk factors for incontinence among women with diabetes. However, few studies have examined both the prevalence and risk factors for overall and type of incontinence (urgency and stress incontinence) among different racial/ethnic groups of women with type 2 diabetes.[9] Continence is controlled through intricate coordination of the core muscles surrounding the abdominal cavity. The PFM stabilizes the neck of the bladder [10] and increases intraurethral pressure to maintain continence.[11] In addition to PFM, the core muscles including the abdominals and diaphragm may play an essential role in trunk control and the maintenance of continence.[12][13][14][15] The "core" refers to "box" or cylinder with the diaphragm as the roof, the pelvic floor and hip girdle muscles at the bottom, the abdominals in the front and side of the belly, and the paraspinal and gluteal muscles at the back.[16] According to the study, in addition to pelvic floor muscles, the core muscles, which include the abdominals and diaphragm, are crucial for trunk control and continence maintenance. It stated as core muscle endurance plays a vital role in maintaining continence so weaker the core muscle endurance, the more severe the urinary incontinence, and the worse the impact on quality of life and also advocated of weaker core muscle endurance as a reason for increasing age in the normal adult married women.[17] Urge incontinence is a significant health problem that can have an impact on an individual's quality of life.[18] As core muscle strength plays vital role in maintaining the activity of detrusor muscles.[19] Therefore study aims to find the correlation of core muscle endurance with urge incontinence, severity and quality of life in middle aged diabetic women.

Objective:

To evaluate the correlation between core muscle endurance with urge incontinence in middle aged diabetic women.

To evaluate the correlation between core muscle endurance with severity in middle aged diabetic women.

To evaluate the correlation between core muscle endurance with quality of life in middle aged diabetic women.

MATERIALS & METHODS

A correlation study was conducted with 39 middle aged diabetic women across Ahmedabad city. Ethical clearance has been taken from the Ethical committee of the Institute. The sample size was calculated according to correlation sample size formula. Subjects were selected according to the inclusion exclusion criteria. All the subjects fulfilled the criteria of inclusion which were: (1) Middle aged women (40-60 age). (2) Women clinically diagnosed with urinary incontinence and type 2 diabetes since 2 years. (3) Women willing to participate. (4) Women having G2 P2 A0. And participants were excluded based on: (1) Women not willing to participate. (2) Participant having any neurological or psychological condition. (3) Subject gone through any abdominal surgery in past.

OUTCOME MEASURE

[1] PPT (Plank Prone Test):

The Prone Plank test required participants to maintain a 90degree angle between elbows and the trunk. Only the elbows and toes were permitted to be in contact with the mat. Any necessary corrections that had to be made within 3-second period otherwise the test was terminated. Total duration for which the correct posture was maintained was recorded for analysis.[20]

[2] ICIQ-UI SF (International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form):

The ICIQ-UI SF is a scoring system developed by the International Consultation on Incontinence Modular Questionnaire study group. It is designed for assessing the prevalence, severity, impact on quality of life, and type of UI. The three key scored items of ICIQ-UI SF are: First is frequency of urine leakage(0: Never, 1: About once a week or less often, 2: Two or three times a week, 3: About once a day, 4: Several times a day, 5: All the time), Second item amount of urine leakage (0: None, 2: A small amount, 4: A moderate amount, and 6: A large amount) and Third is impact on daily life(Visual analogue scale measuring from 0: Not at all to 10: A great deal). The total score ranges from 0 to 21, with a preliminary cut off of 0, and maximum score of 21. Preliminary cut off scores were set to 0 = no incontinence and ≥1= urinary incontinence. Additionally, a fourth non-scored self-diagnostic item included by the expert committee because it was thought to be useful in clinical practice, to understand patients' perception of the cause and type of leakage.[21]

[3] PPIUS (Patient Perception of Intensity of Urgency Scale):

The PPIUS is a 5-point scale recommended for assessing the level of urgency patients feel before each urination. It is also used to measure urinary urgency and urge incontinence. As a part of assessment, participants maintain daily micturition diary for three days within given week. They record details such as the time of urination, whether the episode involved voluntary urination (urine passed into the toilet) or incontinence (involuntary urine release), and the level of urgency. The PPIUS scale classifies response as: "No urgency" to "Mild urgency," "Moderate urgency," "Severe urgency," and "Urge incontinence".[22]

[4] IIQ-7 (Incontinence Impact Questionnaire):

IIQ is a widely recognized, self-reported quality of life questionnaire designed for women experiencing UI. It contains 30 items covering four distinct domains. A shorter alternative, the IIQ-7, includes only seven questions while maintaining the core focus of the original version. IIQ-7 includes four domains: physical activity, travel, social relationships, and emotional health. [23]

STATISTICAL ANALYSIS

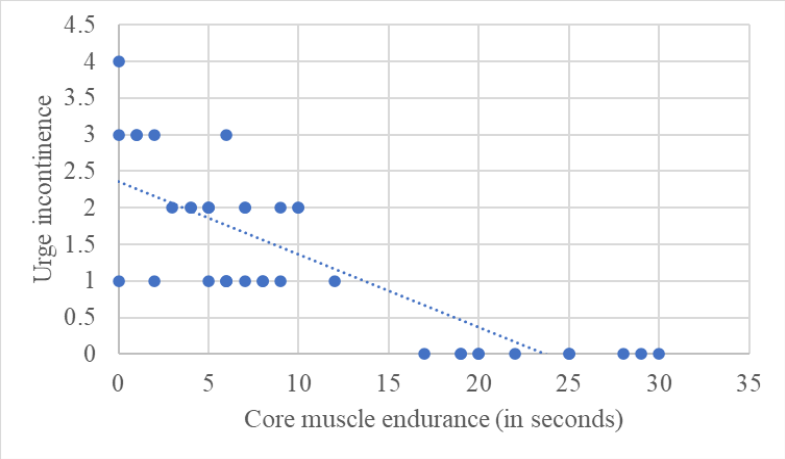
SPSS version 20 software was used for all data analysis. The data collected from 39 participants included Plank prone test (PPT) and scales: Patient perception of Intensity of Urgency scale (PPIUS) for urge incontinence, International consultation on Incontinence Questionnaire Urinary Incontinence Short Form for severity, Incontinence Impact Questionnaire 7 for quality of life. Data analysis indicates a non-normal distribution, therefore the non-parametric statistical method was used. Spearmen's rank correlation coefficient was used to analyse the relationship between core muscle endurance with urge incontinence, severity and quality of life.

RESULT

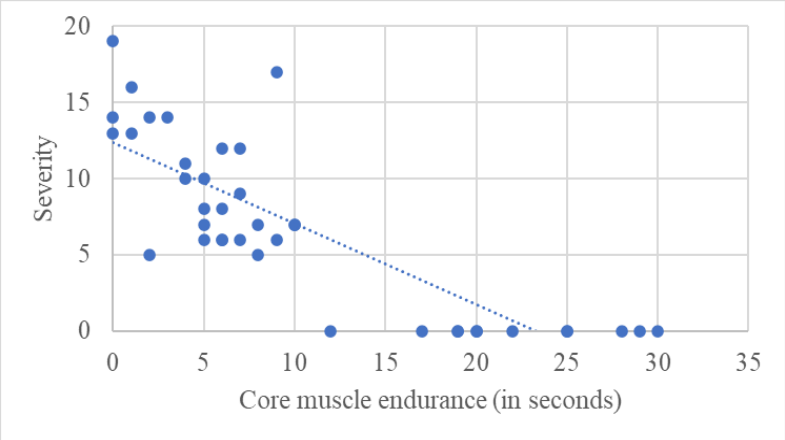
Result shows strong negative correlation between core muscle endurance with urge

incontinence (r =-0.79, p <0.05) (Graph 1), severity (r =-0.82, p<0.05) (Graph 2), quality of life (r=-0.85, p<0.05) (Graph 3).

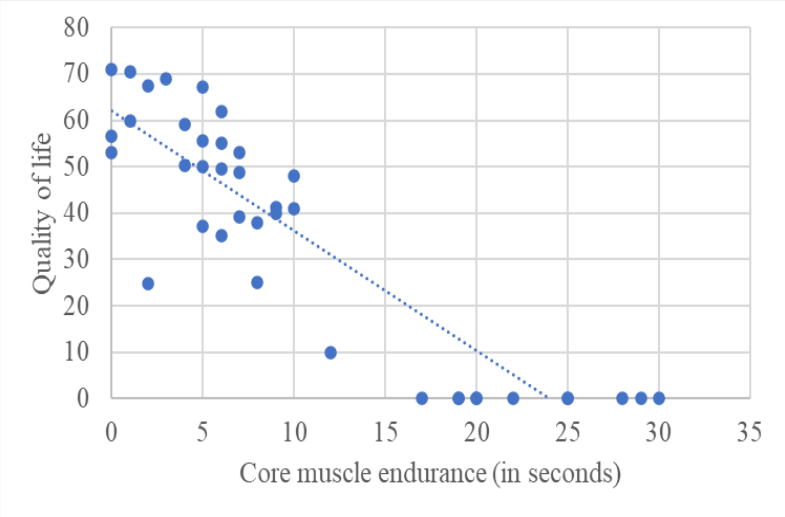
CORE MUSCLE ENDURANCE (IN SEC)	URGE INCONTINENCE	SEVERITY	QUALITY OF LIFE
	r=-0.79 p<0.01	r=-0.82 p<0.01	r=-0.85 p<0.01



Graph 1: Core muscle endurance and urge incontinence.



Graph 2: Core muscle endurance and severity.



Graph 3: Core muscle endurance and quality of life.

DISCUSSION

Urinary incontinence (UI) is a prevalent issue among middle-aged women, particularly those with type 2 diabetes. Several studies have explored the correlation between diabetes and incontinence, attributing the increased prevalence to microvascular damage, neuropathy, and weakened musculature responsible for bladder control.

Several epidemiological studies have reported a higher prevalence of UI among diabetic women. Brown et al. (2006) established that women with type 2 diabetes are 50-200% more likely to experience urinary incontinence compared to non-diabetic women. The study on women with type 2 diabetes suggested that prolonged hyperglycemia leads to neuropathic changes in the bladder, reducing its ability to maintain continence.[24]

Similarly, Lifford et al. (2005) identified women with type 2 diabetes as a significant risk factor for urinary incontinence, highlighting that long-term diabetes leads to an increased likelihood of detrusor overactivity.[6]

Junginger et al. (2010) demonstrated that pelvic floor and abdominal muscle contribute to intraurethral pressure regulation, preventing UI in women and has also said that core muscle endurance is a contributing factor to con tinence control. [10]

Similarly, Raizada and Mittal (2008) found that core muscles, including the diaphragm, plays a critical role in continence through their contribution to intra-abdominal pressure stabilization. [11]

Additionally, Hannestad et al. (2007) identified that the prevalence of incontinence among the diabetic women is 39% and experience higher detrusor instability, contributing to frequent UI episodes. This study found strong correlation between diabetes and urinary incontinence in Norway population.[25]

And another study done by Alghadir et al. (2021) has found strong association of core muscle endurance with the urinary incontinence and they have found this in married women in Saudi Arab.[17]

The study by Bulbuli A. et al. (2023) prevalence of 27.66% of urge incontinence affecting the quality of life in the post-menopausal women and they have also concluded that the core muscle strength impairs the bladder functioning which will lead to incontinence and affects the quality of life in post-menopausal women.[26]

The present study also aligns with these above findings by demonstrating a relation between core muscle endurance and urge incontinence, severity and quality of life. These findings reinforce previous studies that have emphasized the role of pelvic and core muscles in maintaining continence.

Limitations of our study was there was no consideration of the subject's physical activity and BMI.

Future research should focus on intervention-based studies to determine the effectiveness of core muscle training in reducing UI symptoms and improving quality of life in diabetic population.

CONCLUSION

The present study indicates that as core muscle endurance decreases, the severity of urge incontinence increases, leading to a decline in quality of life among middle-aged diabetic women. Given findings clinically implies that it is evident that improving core muscle endurance may be a key intervention strategy for managing UI in diabetic women. Thus, the present study underscores the necessity of incorporating core strengthening exercises into rehabilitation programs for diabetic women with UI.

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

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